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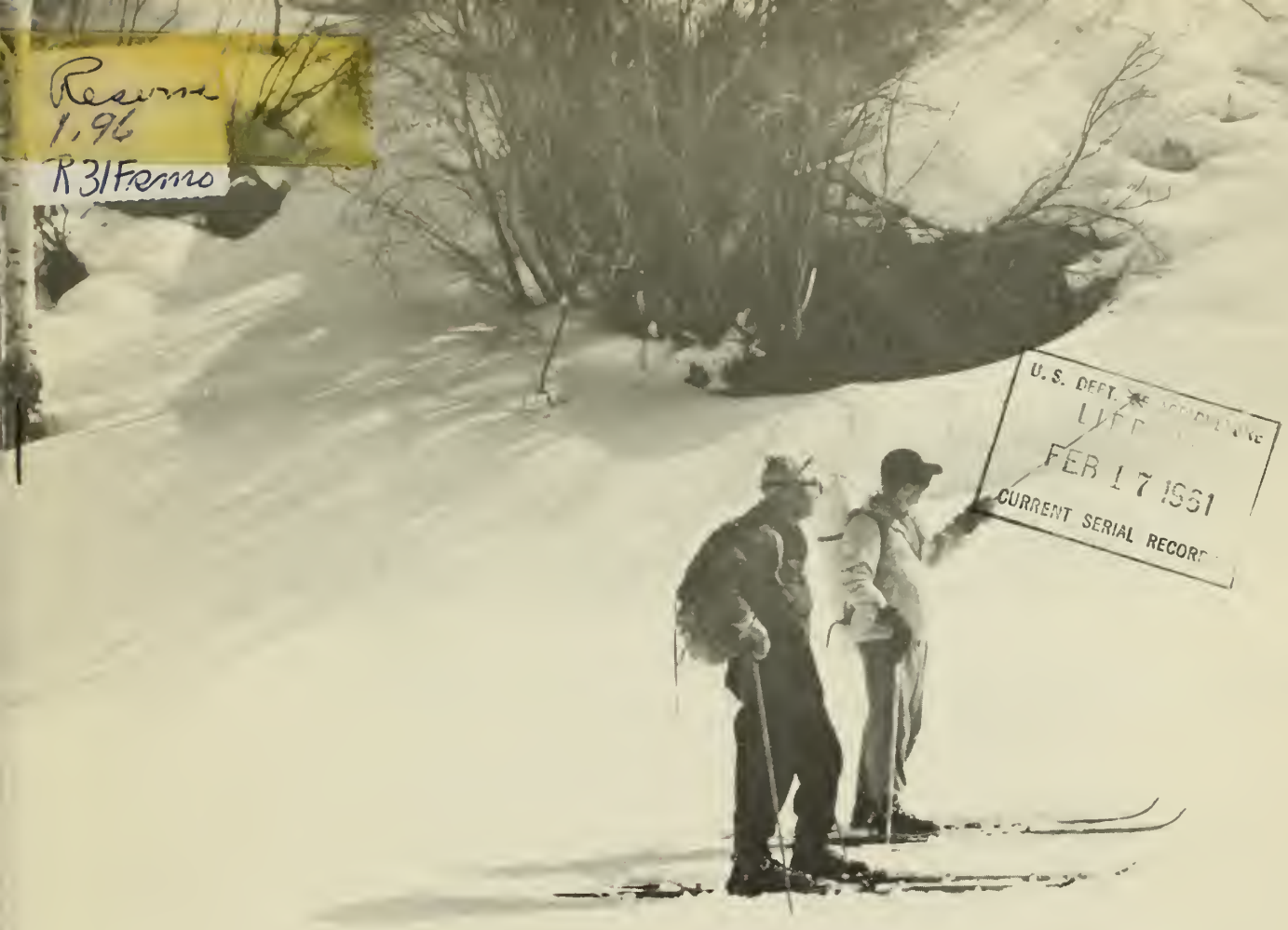

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COOPERATIVE

SNOW SURVEY and WATER SUPPLY FORECASTS for MONTANA & NORTHERN WYOMING

UNITED STATES DEPARTMENT of AGRICULTURE···SOIL CONSERVATION SERVICE,
and
MONTANA AGRICULTURAL EXPERIMENT STATION

Data included in this report were obtained by the agencies named above in cooperation with the Bureau of Reclamation, U.S. Forest Service, U.S. Geological Survey, National Park Service, State Engineers of Montana and Wyoming and other Federal, State, and private organizations.

AS OF

JAN. 1, 1961

USDA-SCS LINCOLN, NEBR. 1961

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

To Recipients of Cooperative Snow Survey and Water Supply Forecast Reports:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Fortunately, most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from fore-knowledge of the runoff.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, about 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1400 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

By relating snow survey measurements taken over a period of years to spring-summer runoff during the same period, relationships have been developed which make it possible to forecast seasonal runoff several months in advance of occurrence. In order to make a forecast, once a forecast relationship has been developed, the maximum snow water content at previously selected key snow courses is usually entered in the forecast relationship. More accurate forecasts are often obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast relationships.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions.

PUBLISHED BY SOIL CONSERVATION SERVICE

REPORTS	ISSUED	LOCATION	COOPERATING WITH
RIVER BASINS			
Colorado and State of Utah	Monthly (Jan.-May)	Salt Lake City, Utah	Utah State Engineer and Other Agencies
Columbia	Monthly (Jan.-May)	Boise, Idaho	Idaho State Reclamation Engineer
Upper Missouri and State of Montana	Monthly (Feb.-May)	Bozeman Montana	Mont. Agr. Exp. Station
West-Wide	Oct. 1, Apr. 1, May 1	Portland, Oregon	All Cooperators
STATES			
Alaska	Monthly (Mar.-May)	Palmer, Alaska	Alaska S.C.D.
Arizona	Semi-Monthly (Jan.15 - Apr.1)	Phoenix, Arizona	Salt R. Valley Water Users Assoc. Ariz. Agr. Exp. Station
Colorado and New Mexico	Monthly (Feb.-May)	Fort Collins, Colorado	Colo. Agr. Exp. Station Colo. State Engineer N. Mex. State Engineer
Idaho	Monthly (Feb.-May)	Boise, Idaho	Idaho State Reclamation Engineer
Nevada	Monthly (Feb.-Apr.)	Reno, Nevada	Nevaoa Dept. of Conservation and Natural Resources Division of Water Resources
Oregon	Monthly (Jan.-May)	Portland, Oregon	Ore. Agr. Exp. Station Oregon State Engineer
Washington	Monthly (Feb.-May)	Spokane, Washington	Wn. State Dept. of Conservation
Wyoming	Monthly (Feb. June)	Casper, Wyoming	Wyoming State Engineer

Copies of these various reports may be secured from: Head, Water Supply Forecasting Section
Soil Conservation Service
209 S. W. Fifth Ave., Portland 4, Oregon

PUBLISHED BY OTHER AGENCIES

REPORTS	ISSUED	AGENCY
British Columbia	Monthly (Feb.-June)	Comptroller, Water Rights Br., Dept. of Lands and Forests, Parliament Bldg., Victoria, B.C., Canaoa
California	Monthly (Feb.-May)	Calif. Dept. of Water Resources, Sacramento, Calif.

FEDERAL-STATE-PRIVATE COOPERATIVE

SNOW SURVEYS and WATER SUPPLY FORECASTS

For

MONTANA AND NORTHERN WYOMING

(Upper Missouri and Upper Columbia River Basins)

Report Prepared
By

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U. S. Department of Agriculture
Soil Conservation Service
and
Montana Agricultural Experiment Station
Bozeman, Montana

Issued By

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Montana Agricultural
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Director
Montana Agricultural
Experiment Station

WATER SUPPLY OUTLOOK
FOR MONTANA
January 1, 1961

The January first snow-pack is considerably below average. At most snow courses the snow-pack is less than it was last January. At present the water supply outlook is poor. Snowfall during the remaining winter months must be considerably above average in order to produce an adequate water supply for this coming irrigation season.

There are a few bright spots among the key stations measured on or about January first. The snow-pack on the Yellowstone and Madison basins is considerably greater than last season, but is still below average.

This season's snow-pack overlies dry mountain soils and will have a significant effect on the 1961 runoff. Rivers and streams whose headwaters are covered with the deeper soil mantles will show the greatest effect as much of the water accumulated in the snow-pack will be required to prime the soil.

Carryover storage in irrigation reservoirs is below average, reflecting the increased irrigation demand and below average stream-flow during the 1960 season.

On the Upper Missouri River basin in Montana, snow cover is 180 percent of last year's and 78 percent of the average January first snow-pack.

On the Columbia River basin in Montana, snow cover is 108 percent of last year's and 80 percent of the average January first snow-pack.

East of the Continental Divide the 1961 January first snow survey measurements as compared with last year's January data and the 1943-57 average for major river basins are: Beaverhead-Jefferson, 105 and 69 percent; Madison-Gallatin, 332 and 82 percent; Missouri Main Stem (Toston to Fort Benton), 75 and 62 percent; and Yellowstone (Yellowstone Park to Billings), 303 and 85 percent.

West of the Continental Divide comparisons are: Flathead River basin, 77 and 86 percent; Upper Clark Fork (Butte to Missoula), 79 and 64 percent; and Lower Clark Fork (Missoula to Idaho boundary), 133 and 87 percent.

UPPER MISSOURI RIVER BASIN
SNOW SURVEY COURSES
IN
MONTANA & NORTHERN WYOMING

LEGEND

- □ TOWNS AND CITIES
- ● 1304 SNOW SURVEY COURSE
- ○ 901 IDAHO & WYOMING NUMBERS
- ▲ STREAM GAGING STATIONS

1960

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE
BOZEMAN MONTANA

SCALE IN MILES 50 25 0 50 100

S.R-11,484 (1960)

INDEX TO MONTANA & NORTHERN WYOMING SNOW COURSES

Drainage Basin and Course Name	Montana Number	Elev.	Location Sec. Lat.	Twp.	Range Long.	Record Began	Measuring Dates	Measured By
JEFFERSON RIVER		MISSOURI RIVER DRAINAGE						
(BOSA-BEAVERHEAD)								
Lakeview Ridge	11E3	7400	27	14S	2W	1948	3,4,5	10
Lakeview Canyon	11E4	6930	26	14S	2W	1948	3,4,5	10
Limekiln	12E2	6950	5	15S	9W	1948	3,4	1
White Pine Ridge	12E1	8850	18	14S	9W	1948	3,4	1
(HORSE PRAIRIE)								
Bloody Dick	13D10	7600	12	8S	16W	1948	3,4	1
Gold Stone	13D9	8100	11	8S	16W	1948	3,4	1
Lemhi Pass	13E1	7450	9	10S	15W	1948	3,4	1
Ferrell Creek	13D12	6650	14	9S	15W	1948	3,4	1
Trail Creek	13E2	7090	15	10S	15W	1948	3,4	1
Selway Junction	13D11	6800	27	8S	15W	1948	3,4	1
(BIG HOLE)								
Big Hole Pass	13D3	7240	28	3S	18W	1948	3,4	1
Big Hole Pass-Be.	13D4	6900	24	3S	18W	1948	3,4	1
East Boundary	13D5	6700	22	3S	17W	1948	3,4	1
Gibbons Pass	13D2	7100	4	2S	19W	1934	1,2,3,4,5	1,3
Jahnke Creek	13D8	7340	25	7S	16W	1948	3,4	1
Miner Forks	13D6	7300	24	6S	17W	1948	3,4	1
Miner Lake	13D7	6720	10	6S	16W	1945	3,4,5	1
(WISE RIVER)								
Anderson Mdw.	13D14	7000	18	3S	12W	1948	3,4	1
Elk Horn	13D15	8450	15	4S	12W	1935	3,4,5	3
Wise River	13D13	6300	15	2S	12W	1948	3,4	1
(RUBY RIVER)								
Flashlight	12D3	6950	22	8S	7W	1945	3,4,5	1
MADISON RIVER								
Hebgen	11E5	6550	22	11S	3E	1934	1,2,3,4,5	3
West Yellowstone	11E7	6700	34	13S	5E	1934	1,2,3,4,5	3
Norris Basin	10E2	7500	44°44'		110°-42'	1936	3,4	6
GALLATIN RIVER								
Devil's Slide	10D4	8100	14	5S	6E	1935	2,3,4,5	2,1
Hood Meadow	10D3	6600	22	4S	6E	1935	2,3,4,5	2,1
New World	10D1	6700	24	3S	6E	1939	1,2,3,4,5	7
21-Mile	11E6	7150	1	11S	5E	1934	1,2,3,4,5	3
MISSOURI RIVER MAIN STEM								
Chessman Reservoir	12C5	6200	2	8N	5W	1936	1,2,3,4,5	3
Crystal Lake	9C1	6100	19	12N	18E	1941	3,4	1,2
Grasshopper	10C2	7000	19	9N	8E	1938	3,4	2
Kings Hill	10C1	7950	35	13N	7E	1934	3,4,5	3
Picnic Grounds	12C6	6500	10	5N	6W	1941	2,3,4	4
Pipestone Pass	12D1	7200	10	1N	7W	1938	2,3,4,5	1
Stemple Pass	12C1	6900	16	13N	7W	1934	3,4,5	3
Ten Mile Creek L	12C2	6250	13	8N	6W	1935	1,2,3,4,5	3
Ten Mile Creek M	12C3	6800	13	8N	6W	1934	1,2,3,4,5	3
Ten Mile Creek U	12C4	8000	19	8N	5W	1935	1,2,3,4,5	3
(TETON RIVER)								
Freight Creek	12A1	6000	13	26N	10W	1948	3,4	1
Waldron Creek	12B2	5600	16	25N	9W	1948	3,4	1
West Fork	12B1	6000	6	25N	9W	1948	3,4	1
(SUN RIVER)								
Benchmark	12B8	5500	9	20N	10W	1948	3,4	1
Cabin Creek	12B6	5400	33	23N	10W	1949	3,4	1,2
S-Bull	12B9	5600	36	20N	10W	1948	3,4	1,2
Gates Park	12B5	5300	31	24N	10W	1949	3,4	1,2
Goat Mountain	12B7	7000	20	22N	10W	1934	3,4	3
Wrong Ridge	12B3	6800	17	25N	10W	1949	3,4	1,2
Wrong Creek	12B4	5700	32	25N	10W	1949	3,4	1,2
(MARIAS RIVER)								
Marias Pass	13A5M	5250	34	30N	14W	1934	1,2,3,4,5	3
(MILK RIVER)								
Rocky Boy	9A1	5200	15	28N	16E	1941	3,4	7
(MUSSELSHELL RIVER)								
Grasshopper	10C2	7000	19	9N	8E	1938	3,4	2

Drainage Basin and Course Name	Montana Number	Elev.	Location Sec. Lat.	Twp.	Range Long.	Record Began	Measuring Dates	Measured By
MISSOURI RIVER DRAINAGE (cont.)								
(UPPER YELLOWSTONE)								
Camp Senie	9D1	7890	2	8S	18E	1937	4	1
Canyon	10E3	7750	44°-44'		110°-30'	1938	1,2,3,4,5	6
Cooke City	10D7	7400	25	9S	14E	1937	1,2,3,4,5	6
Crevice Mt.	10D5	8400	22	9S	9E	1935	3,4	2
Independence	10D6	8000	22	7S	12E	1940	3,4	1
Lake Camp	10E4	7850	44°-34'		110°-24'	1936	1,2,3,4,5	6
Lupine Creek	10E1	7300	44°-54'		110°-37'	1938	1,2,3,4,5	6
Lodgepole	9E1	8200	32	56N	106W	1940	2,3,4,5	1,4
West Rosebud	9D2	7500	10	7S	16E	1960	1,2,3,4,5	4
(SHIELDS RIVER)								
Porcupine	10C3	6500	10	4N	10E	1938	3,4	1
LOWER YELLOWSTONE								
(WIND RIVER) Wyoming								
Big Warm	9F12	8800	36	42N	109W	1955	2,3,4,5	1
Brooke Lake #3	10F8	9200	23	44N	110W	1939	2,3,4,5	1
Burroughs Creek	9F4	8800	15	43N	107W	1948	2,3,4,5	1
Dinwoodie	9F10	10000	21	39N	105W	1948	2,3,4,5	1
Dry Creek	9F9	9500	34	4N	6W	1948	2,3,4,5	1
DuNoir	9F6	8750	27	42N	108W	1940	2,3,4,5	1
East Fork	9F13	9200	23	44N	104W	1956	2,3,4,5	1
Geyser Creek	9F7	8500	12	41N	108W	1948	2,3,4,5	1
Little Warm	9F8	9500	24	41N	108W	1948	2,3,4,5	1
Sheridan R.S. #1	9F5	7500	3	42N	109W	1939	2,3,4,5	1
Sheridan R.S. #2	9F14	7500	3	42N	109W	1955	2,3,4,5	1
T-Cross Ranch	9F3	8000	1	43N	107W	1940	2,3,4,5	1
Togwotee Pass	10F9	9600	29	44N	110W	1936	2,3,4,5	11
(POPO AGIE RIVER) Wyoming								
Blue Ridge	8G2	9500	23	31N	101W	1939	2,3,4,5	1
Bruce's Camp	8G5	6500	24	32N	101W	1955	2,3,4	1
Hobb's Park	9G3	10000	22	2S	3W	1948	2,3,4,5	1
Mosquito Park R.S.	9G4	9500	23	2S	3W	1940	2,3,4,5	1
Sawmill Glade	8G1	8500	3	31N	101W	1939	2,3,4,5	1
South Pass	8G3	9000	13	30N	101W	1939	2,3,4,5	1
St. Lawrence	9F11	9000	26	1N	4W	1940	2,3,4,5	1
Trout Creek	9G2	8400	5	2S	2W	1948	2,3,4,5	1
(OWL CREEK) Wyoming								
Beavers Mill	9F2	8900	6	43N	102W	1948	2,3,4,5	1
Owl Creek	8F1	8700	36	43N	101W	1948	2,3,4,5	1
(GREYBULL RIVER) Wyoming								
Timber Creek #1	9E2	8800	25-	47N	103W	1948	2,3,4,5	1
Timber Creek #2	9E3	8800	25	47N	103W	1955	2,3,4,5	1
Wood River #1	9F1	8000	28	46N	103W	1939	2,3,4,5	1
Wood River #2	9F15	8000	28	46N	103W	1956	2,3,4,5	1
(SHOSHONE RIVER) Wyoming								
East Entrance	10E6	7000	17	52N	109W	1948	1,2,3,4,5	6
Sylvan Pass	10E5	7100	12	52N	110W	1936	1,2,3,4,5	6
(NOWOOD CREEK) Wyoming								
Cold Springs Camp	7E25	8700	1	50N	88W	1956	2,3,4,5	1
Medicine Lodge Lks	7E24	9500	7	51N	87W	1956	2,3,4,5	1
Munkers Pass	7E8	9700	11	48N	85W	1950	2,3,4,5	1
North Powder	7E36	8300	20	47N	85W	1956	2,3,4,5	1
Onion Gulch	7E27	8100	31	48N	85W	1956	2,3,4,5	1
Tensleep Lake	7E26	9075	33	50N	86W	1956	2,3,4,5	1
Tensleep R.S.	7E7	8300	30	49N	86W	1935	2,3,4,5	1
Tyrell R.S.	7E35	8300	30	49N	86W	1956	2,3,4,5	1
(SHELL CREEK) Wyoming								
Bald Mountain	7E21	9600	33	56N	91W	1956	2,3,4,5	1
Beaver-Tongue Div.	7E20	9200	12	55N	91W	1956	2,3,4,5	1
Bone-Spring Div.	7E18	9200	32	55N	89W	1956	2,3,4,5	1
Granite Creek Camp	7E22	7800	15	53N	89W	1956	2,3,4,5	1
Granite Pass	7E17	8950	19	54N	88W	1956	2,3,4,5	1
Horse-Trail Div.	7E19	9200	29	55N	90W	1956	2,3,4,5	1
Ranger Creek	7E4	8800	32	53N	88W	1935	2,3,4,5	1
Shell Creek	7E23	9600	12	52N	88W	1956	2,3,4,5	1
(PORCUPINE CREEK) Wyoming								
Five Spga. Falls	7E31	7500	19	56N	92W	1956	2,3,4,5	1
Medicine Wheel	7E30	9000	24	56N	92W	1956	2,3,4,5	1
(TONGUE RIVER) Wyoming								
Beever Tongue Div.	7E20	9200	12	55N	91W	1956	2,3,4,5	1
Big Goose #1	7E2	7700	4	53N	86W	1935	2,3,4,5	1
Big Goose #2	7E32	7700	4	53N	86W	1955	2,3,4,5	1
Bone-Spring Div.	7E18	9200	32	55N	89W	1956	2,3,4,5	1
Burgess R.S. #1	7E1	7900	36	56N	89W	1950	2,3,4,5	1
Burgess R.S. #2	7E33	7900	36	56N	89W	1955	2,3,4,5	1
Dome Lake #1	7E3	8800	11	53N	87W	1950	2,3,4,5	1
Dome Lake #2	7E34	8800	11	53N	87W	1950	2,3,4,5	1
Gloom Creek	7E16	9300	32	55N	87W	1956	2,3,4,5	1
Granite Pass	7E17	8950	19	54N	88W	1956	2,3,4,5	1

Drainage Basin and Course Name	Montana Number	Elev.	Location Sec. Lat.	Twp.	Range Long.	Record Began	Measuring Dates	Measured By
MISSOURI RIVER DRAINAGE (cont.)								
(TONGUE RIVER cont.)								
Horse Trail Div.	7E19	9200	29	55N	90W	1956	2,3,4,5	1
Lake Ocneva	7E16	9000	7	52N	86W	1956	2,3,4,5	1
North Tongue	7E15	8800	17	55N	89W	1956	2,3,4,5	1
Sibley Lake	7E11	8000	10	55N	88W	1956	2,3,4,5	1
Sucker Creek	7E12	9000	19	55N	87W	1956	2,3,4,5	1
Steamboat Point	7E10	7500	32	56N	87W	1956	2,3,4,5	1
Wood Rock O.S.	7E13	8500	3	54N	88W	1956	2,3,4,5	1
(POWDER RIVER) Wyoming								
Crazy Woman	6E2	8200	6	47N	84W	1956	2,3,4,5	1
Muddy Creek O.S.	6E1	7800	2	48N	84W	1956	2,3,4,5	1
Munkere Pass	7E8	9700	11	48N	85W	1950	2,3,4,5	1
North Powder #2	7E36	8300	20	47N	85W	1956	2,3,4,5	1
Onion Gulch	7E27	8100	31	48N	85W	1956	2,3,4,5	1
Soldier Park	7E5	8700	36	51N	85W	1950	2,3,4,5	1
Sour Dough	7E6	8500	17	49N	84W	1936	2,3,4,5	1
COLUMBIA RIVER BASIN								
KOOTENAI RIVER								
Baree Creek	15B11	5500	6	25N	30W	1956	4,5,5½	2
Baree Mountain	15B1	6000	1	25N	31W	1937	4,5,5½	2
Red Mountain	15A1	6000	4	36N	29W	1937	3,4,5,5½	1,2
Weasel Divide	14A7	5450	8	37N	24W	1955	4,5,5½	1,2
FLATHEAD RIVER								
Basin Creek	13B11A	5000	11	19N	12W	1951	2,3,4,5	2
Big Creek	13B3	6750	6&7	22N	18W	1941	3,4,5	5
Brush Creek	14A4	5000	13	30N	26W	1937	3,4,5	1,2
Cattle Queen	13A1	4700	7	35N	17W	1939	3,4,5	6
Desert Mountain	13A2M	5600	24	31N	19W	1937	1,2,3,4,5	1,2
Hell Roaring Div.	14A3	5770	35	32N	22W	1942	3,4,5	1,2
Holbrook	13B13A	4530	18	21N	13W	1951	1,2,3,4,5	2
Kiehenehn	14A6	3886	14	37N	22W	1954	4,5	6
Logan Creek	14A5	4300	34	30N	24W	1937	3,4,5	2
Marias Pase	13A5M	5250	34	30N	14W	1934	1,2,3,4,5	3
Mineral Creek	13A16	4000	29	35N	17W	1957	3,4,5	6
Quintonkon	13A13	3800	11	26N	17W	1951	2,3,4,5	1,2
Spotted Bear Mt.	13B2M	7000	23	25N	15W	1948	3,4,5	1,2
Strawberry Lake	13A10	6500	11	28N	19W	1946	3,4,5	2
Trinkus Lake	13B1	6500	9	25N	17W	1948	3,4,5	2
Trout Lake	13A12M	3600	21	28N	17W	1948	3,4,5	1,2
Twin Creeks	13B11	3580	14	26N	16W	1951	2,3,4,5	1,2
Upper Holland Lk.	13B5	7000	28	20N	16W	1948	3,4,5	2
CLARK FORK								
Baree Creek	15B11	5500	6	25N	30W	1956	4,5,5½	2
Barae Mountain	15B1	6000	1	25N	31W	1937	4,5,5½	2
Black Pine	13C13	7100	25	8N	15W	1960	3,4,5	1
Coyote Hill	13B10	4200	12	18N	16W	1952	1,2,3,4,5	2
El Dorado Mine	13C9	7800	23	8N	12W	1949	4	1
Fred Burr Pass	13C11	8000	12	6N	13W	1957	3,4,5	1
Freezeout Summit	15B10	6800	21	15N	27W	1937	4,5	2
Gold Creek Lk.	13C10	7200	14	8N	12W	1949	4	1
Hoodoo Creek	15C1	6200	9	14N	27W	1937	4,5	2
Intergaard	13C4	6450	6	5N	13W	1936	2,3,4	4
Lubrecht Forest #6	13C8	4400	11	14N	15W	1951	1,2,3,4,5	12
North Fork Jocko	13B7	6330	3	17N	17W	1941	3,4,5	5
Pipestone Pass	12D1	7200	10	1N	7W	1938	2,3,4,5	1
Red Lion	13C12	7000	27	6N	13W	1958	3,4,5	1
Slide Rock Mt.	13C2	7100	35	10N	16W	1937	4	1
Southern Cross	13C5	6500	8	5N	13W	1936	2,3,4	4
Stemple Pass	12C1	6900	16	13N	7W	1934	3,4,5	3
Storm Lake	13C7	7780	19	4N	13W	1939	2,3,4	1
Stuart Mill	13C6	6500	19	5N	13W	1936	2,3,4	4
Stuart Mountain	13C1	7400	6	14N	18W	1936	4	1,2
TV Mountain	14B1	6800	33	15N	19W	1956	1,2,3,4,5	1
BITTERROOT RIVER								
Ambrose	13C16	6475	28	9N	18W	1960	3,4,5	1
East Fork R.S.	13D1	5400	16	2N	17W	1937	4	1
Gibbons Pass	13D2	7100	4	2S	19W	1934	1,2,3,4,5	3,1
Lolo Pass	14C5	5230	16	38N	15E	1956	3,4,5,5½	2
Lost Horse	14C7	5940	5	4N	23W	1960	3,4,5	1
Nez Perce Camp	14M2	5580	19&20	1S	23W	1937	3,4,5	1
Nez Perce Pass	14D1	6575	32	28N	17E	1937	1,2,3,4,4½,5,5½	1
Powell R.S.	14C6	4230	33	37N	14E	1956	3,4,5,5½	2
Skalkaho Summit	13C3	7259	30	6N	17W	1937	4	1
Twin Lakes	14C8	6510	32	5N	23W	1960	3,4,5	1
SASKATCHEWAN RIVER BASIN								
ST. MARY RIVER								
Iceberg Lake #3	13A3	5600	48°-50'		113°-43'	1922	5	
Josephine Upper	13A15	5000	48°-50'		113°-42'	1956	5	3,9
Josephine Lower #9	13A14	4900	48°-47'		113°-41'	1955	5	
Mount Allen #7	13A7	5700	48°-46'		113°-41'	1922	5	3,9
Piegan #6	13A6	5500	48°-46½'		113°-41½'	1922	5	3,9
Ptarmigan #8	13A8	5800	48°-50'		113°-44'	1937	5	3,9

a. Numerals 1,2,3,4 and 5 refer to January 1, February 1, March 1, April 1 and May 1.

b. Numerals refer to Agency that secures the snow survey as follows:

1. Soil Conservation Service
2. U. S. Forest Service
3. U. S. Geological Survey
4. Montana Power Company
5. U. S. Indian Service
6. National Park Service
7. Montana Experiment Station
8. City of Bozeman
9. Dominion Water & Power Bureau
10. U. S. Fish and Wildlife Service
11. U. S. Bureau of Reclamation
12. Montana State Forestry School

M - Soil Moisture
A - Aerial Marker

5,R-11,684 - (1960)

COMPARISON OF SNOW COVER WITH THAT OF PREVIOUS YEARS

Summary of Snow Survey Data by Tributary Watersheds January 1, 1961

TRIBUTARY WATERSHED	No. of Courses Averaged	No. Years Used	1961 Snow Water Equivalent Expressed as Percent of	
			1960	1943-57 Average
COLUMBIA RIVER BASIN IN MONTANA				
Flathead	2	8-15	77	86
Upper Clark Fork	5	6-15	79	64
Lower Clark Fork	4	5-8	133	87
Bitterroot	1	8	152	80
MISSOURI RIVER BASIN IN MONTANA				
Marias, Teton & Sun	1	15	89	77
Missouri Main Stem	4	15	75	62
Beaverhead-Jefferson	7	8-15	105	69
Madison-Gallatin	7	4-15	332	82
Upper Yellowstone	5	4-11	303	85

MONTANA SNOW SURVEYS ABOUT JANUARY 1, 1961

MISSOURI DRAINAGE

No.	Snow Course Name	Elev.	Current Information			Past Record		
			Date of Survey	Snow Depth (In.)	Water Content (In.)	Water Content (In.) Last Year	Water Content (In.) 15-Year Average 1943-57	Years Record Used in Average
BEAVERHEAD-JEFFERSON BASIN								
12E3	Camp Creek	6800	12/29	16	2.6	2.3	4.3*	14
12C5	Chessman Res.	6200	12/27	6	0.8	1.1	2.2	15
13D2	Gibbons Pass	7100	12/29	35	9.0	5.9	11.2*	8
11E12	Kilgore	6200	12/29	20	3.6	2.0	4.8*	13
12D1	Pipestone Pass	7200	12/28	15	2.4	2.8	-	-
13C7	Storm Lake	7780	12/29	27	5.4	4.7	-	-
12C2	Tenmile, Lower	6250	12/29	15	2.6	3.3	3.5	15
12C3	Tenmile, Middle	6800	12/28	20	3.5	4.4	5.4	15
12C4	Tenmile, Upper	8000	12/28	22	4.2	6.0	6.7	15
MADISON-GALLATIN BASIN								
11E9	Big Springs	6500	12/29	31	6.8	1.5	8.2	15
11E5	Hebgen	6550	12/28	24	4.2	2.0	5.9	15
11E10	Island Park	6315	12/29	27	5.5	1.5	6.3	15
10E2	Norris Basin	7500	12/29	20	4.4	1.4	5.0*	4
11E6	Twenty-One Mile	7150	12/28	30	7.0	2.5	8.6	15
11E8	Valley View	6500	12/29	25	4.8	1.5	5.8	15
11E7	West Yellowstone	6700	12/28	20	4.4	0.8	5.7	15
MISSOURI MAIN STEM								
12C5	Chessman Res.	6200	12/27	6	0.8	1.1	2.2	15
12C2	Tenmile, Lower	6250	12/29	15	2.6	3.3	3.5	15
12C3	Tenmile, Middle	6800	12/28	20	3.5	4.4	5.4	15
12C4	Tenmile, Upper	8000	12/28	22	4.2	6.0	6.7	15
MARIAS, TETON & SUN BASIN								
13A5M	Marias Pass	5250	12/28	27	6.2	7.0	8.1	15
UPPER YELLOWSTONE BASIN								
10E3	Canyon	7500	1/2	28	4.9	1.2	6.8*	11
10D7	Cooke City	7400	12/31	19	3.5	1.9	4.1*	11
10E4	Lake Camp #1	7850	1/1	21	3.7	1.0	4.7*	9
10E1	Lupine Creek	7300	12/30	22	5.0	1.6	4.8*	4
10E2	Norris Basin	7500	12/29	20	4.4	1.4	5.0*	4

*Average for years of record shown in 1943-57 period.

MONTANA SNOW SURVEYS ABOUT JANUARY 1, 1961

COLUMBIA DRAINAGE

No.	Snow Course Name	Elev.	Current Information			Past Record		
			Date of Survey	Snow Depth (In.)	Water Content (In.)	Water Content (In.)		Years Record Used in Average
						Last Year	15-Year Average 1943-57	
FLATHEAD BASIN								
13A2M	Desert Mountain	5600	12/23	26	5.9	8.7	6.0*	8
13A5M	Marias Pass	5250	12/28	27	6.2	7.0	8.1	15
13B2M	Spotted Bear Mt.	7000	12/28	25	5.6	6.9	-	-
13A12M	Trout Lake	3600	12/29	22	4.6	5.9	-	-
13B11	Twin Creeks	3580	12/27	25	5.7	5.6	-	-
UPPER CLARK FORK BASIN								
12C5	Chessman Res.	6200	12/27	6	0.8	1.1	2.2	15
13C8	Lubrecht For. #6	4040	1/3	10	1.6	1.3	1.9*	6
12D1	Pipestone Pass	7200	12/28	15	2.4	2.8	-	-
13C7	Storm Lake	7780	12/29	27	5.4	4.7	-	-
12C2	Tenmile, Lower	6250	12/29	15	2.6	3.3	3.5	15
12C3	Tenmile, Middle	6800	12/28	20	3.5	4.4	5.4	15
12C4	Tenmile, Upper	8000	12/28	22	4.2	6.0	6.7	15
LOWER CLARK FORK BASIN								
13B10	Coyote Hill	4200	12/30	21	3.8	4.2	5.2*	6
15B2	Lookout	5250	12/30	57	15.8	11.2	17.4*	8
13C8	Lubrecht For. #6	4040	1/3	10	1.6	1.3	1.9*	6
14B1	TV Mountain	6800	1/2	35	8.7	6.2	-	-
15C2	Fish Lake Airstrip	5000	12/28	60	14.6	10.2	16.7*	5
BITTERROOT BASIN								
13D2	Gibbons Pass	7100	12/29	35	9.0	5.9	11.2*	8

*Average for years of record shown in 1943-57 period.

AVAILABLE SOIL MOISTURE
as of
January 1, 1961

Drainage Basin and Station	Station No.	Elev.	Soil Profile in Inches		Date	Soil Moisture Content in Inches About 1/1/61				Yrs
			Depth	Cap.		1961	1960	1959	Avg.	
GALLATIN										
College Site	11D2M	4856	54	14.5	12/30	7.1	10.3	8.8	8.0	4
SHIELDS										
Battle Ridge	10D11M	6020	48	13.3	12/30	10.7	-	-	-	-
Shields River	10C4M	5850	48	15.9	12/30	10.9	-	-	-	-
FLATHEAD										
Desert Mountain	13A2M	6370	54	6.8	12/23	6.0	7.7	7.4	6.9	4
Marias Pass	13A5M	5250	54	8.4	12/24	4.8	6.6	6.1	5.4	5
Spotted Bear R.S.	13B15M	3700	28	5.9	12/29	4.2	4.8	5.0	4.5	4
Trout Lake	13A12M	3600	54	11.8	12/29	12.4	11.9	12.5	11.6	4

AVAILABLE SOIL MOISTURE
as of
October 1, 1960

						1960	1959	1958	Avg.	
GALLATIN										
College Site	11D2M	4856	54	14.5	9/30	5.8	8.6	6.8	5.8	4
SHIELDS										
Battle Ridge	10D11M	6020	48	13.3	10/3	10.6	-	-	-	-
Shields River	10C4M	5850	48	15.9	10/3	11.5	-	-	-	-
FLATHEAD										
Desert Mountain	13A2M	6370	54	6.8	9/23	4.5	7.2	5.9	5.5	4
Marias Pass	13A5M	5250	54	8.4	9/26	3.2	5.6	4.5	4.7	6
Spotted Bear R.S.	13B15M	3700	28	5.9	9/23	0.6	4.3	3.7	3.1	4
Trout Lake	13A12M	3600	54	11.8	9/23	6.9	9.8	10.5	7.9	4

STATUS OF RESERVOIR STORAGE

January 1, 1961

BASIN & STREAM	RESERVOIR	USABLE CAPACITY 1000 A.F.	USABLE STORAGE - 1000 ACRE FEET			
			1961	1960	1943-57 Average	Years Record Used
COLUMBIA RIVER BASIN - MONTANA						
Flint Creek	Georgetown Lk.	31.0	27.1	24.6	25.3	15
S. Fk. Flathead	Hungry Horse	3428.0	3423.0	3381.0	2708.6**	5
Flathead River	Flathead Lake	1791.0	1260.0	1535.0	1257.1	15
Flathead River 4/	Camas Res.	42.8	22.1	34.1	24.4	15
Flathead River 5/	Mission Valley	98.6	26.6	54.0	28.2	15
MISSOURI RIVER BASIN - MONTANA						
Ruby River	Ruby	38.8	13.2	-	17.8**	8
Beaverhead	Lima	84.0	10.5	23.0	32.4	15
Madison River	Hebgen Lake	345.0	129.2	37.0	240.3	15
Madison River	Ennis Lake	41.0	39.1	31.2	37.6	15
Hyalite Creek	Middle Creek	8.0	2.8	3.8	2.9**	7
Missouri River	Canyon Ferry	2043.0	1553.0	1734.0	1503.4**	5
Missouri River	Hauser & Helena Lakes	61.9	60.1	59.6	52.4	15
Missouri River	Lake Helena	10.4	9.8	9.6	8.3**	13
Missouri River	Holter Lake	81.9	54.8	78.6	71.6	15
N. Fk. Sun River	Gibson	105.0	32.6	69.4	55.5	15
N. Fk. Sun River	Willow Creek	32.3	14.6	13.9	18.4	15
N. Fk. Sun River	Pishkun	32.0	17.2	22.1	19.0	15
Marias River	Tiber	1316.0	625.1	628.8	-	-
Birch Creek	Swift	30.0	11.3	22.6	18.1	15
Dupuyer & Birch	Lake Francis	112.0	78.3	96.3	94.4	15
Musselshell	Durand	7.0	3.4	4.0	4.3	15
Musselshell	Martinsdale	23.1	3.7	6.8	9.5	15
Missouri River	Ft. Peck 3/	19410.0	11530.0	11140.0	11061.0	15
Milk River	Fresno	127.2	29.5	84.6	66.6	15
Milk River	Nelson	66.8	43.6	52.6	37.2	15
W. Rosebud Cr.	Mystic Lake	20.8	14.9	14.0	14.4	15
Tongue River	Tongue River	68.0	6.8	14.2	8.2	15

** Average for years of record shown in 1943-57 base period.

3/ Gross contents; usable capacity less 617.0 A.F.; minimum power pool 4,500.0 A.F.

4/ Camas Reservoirs are shown as a sum of four (4) small reservoirs on the west side of Flathead Lake located on Dry Creek and Little Bitterroot River.

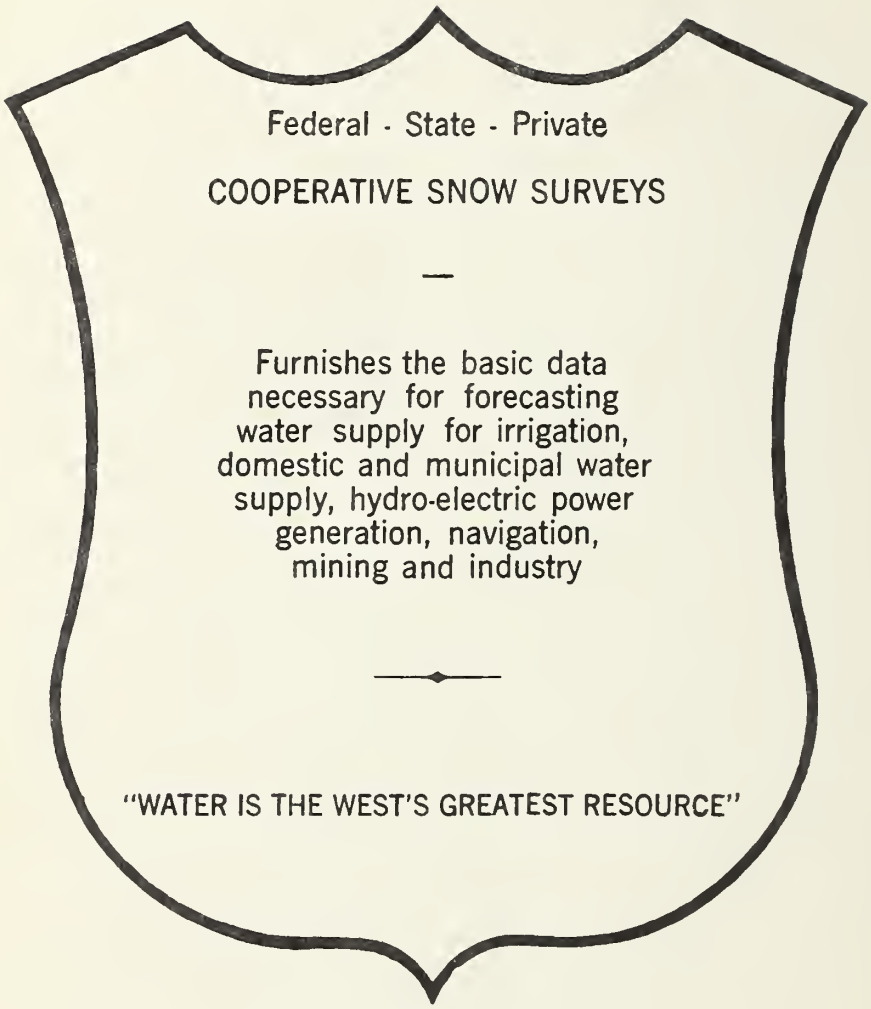
5/ Mission Valley Reservoirs are shwon as a sum of eight (8) small reservoirs located south and east of Flathead Lake. Both Camas and Mission Valley Reservoirs are operated by the Indian Irrigation Service.

STATUS OF RESERVOIR STORAGE

January 1, 1961

BASIN & STREAM	RESERVOIR	USABLE CAPACITY 1000 A.F.	USABLE STORAGE - 1000 ACRE FEET			
			1961	1960	1943-57 Average	Years Record Used
MISSOURI RIVER BASIN - WYOMING						
Shoshone River	Buffalo Bill	440.0	124.4	157.5	272.4	15
Wind River	Boysen	560.0AC	84.7	178.7	309.2**	5
Wind River	Pilot Butte	31.6	9.6	8.0	9.1	15
Bull Creek	Bull Lake	152.0	57.1	50.6	80.4	15
Belle Fourche	Key Hole	190.0AC	3.1	0.1	10.3**	5
MISSOURI RIVER BASIN - NORTH DAKOTA						
Heart River	Lake Tschida	68.7AC	50.0	45.8	53.6**	7
Heart River	E. A. Patterson	5.6AC	3.5	3.9	3.6**	6
Missouri River	Garrison Lake	18100.0AC	5968.0	4026.7	-	-
James River	Jamestown	220.0AC	15.7	8.4	-	-
MISSOURI RIVER BASIN - SOUTH DAKOTA						
Belle Fourche	Belle Fourche	185.2AC	16.1	20.5	84.8	15
Cheyenne River	Angostura	90.0AC	2.0	16.0	44.3**	6
Cheyenne River	Deerfield	15.1AC	2.1	1.0	12.3**	10
Grand River	Shadehill	84.0AC	52.3	70.4	76.3**	5
Missouri River	Ft. Randall	3800.0AC	2373.7	2289.6	-	-
Missouri River	Gavins Point	320.0AC	302.0	236.3	-	-
Missouri River	Oahe	17000.0AC	190.0T	205.0T	-	-
Cheyenne River	Pactola	55.0AC	15.7	23.5	-	-

** Average for years of record shown in 1943-57 base period.
AC Active Capacity; USBR Billings.
T Total Storage.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